

Margarine, Fatty Acids and Your Health

To maintain good health it is important that we have the correct intake of omega fatty acids in our diets.

Hydrogenated fats like margarine are non-foods with toxic effects and should be avoided at any cost.

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HEALTH FOOD LABELS MAY DECEIVE

Have you ever spent extra money to purchase a 'higher-quality' health food or vitamin product, only to discover some time later that it wasn't all it was claimed to be? It has happened in our family more than once. Our most recent experience was with a line of vegetable oils sold in health food stores and co-ops. The attractively labelled bottles touted their special processing techniques, implying low temperatures and the superior quality of their product. We had used their canola oil for many years when I decided to write the company with some questions and request information on their oils.

We were shocked to find out that the "cold-pressed" and "lightly refined" canola oil was subjected to the same high temperatures (450°-500° Fahrenheit, or 232°-260° Celsius) and most of the chemical processing steps suffered by regular grocery store oils! The main difference was that they didn't use chemical solvents to extract the oil from the seeds or add preservatives or defoamer.

Disappointed, and determined to find a source of healthy oils for my family, I began a search for accurate information on the production of food oils to supplement my scanty knowledge. This article is the culmination of that exploration to date, and will provide you with information you need to make healthier selections of foods and oils for your family.

THE IMPORTANCE OF FATTY ACIDS

Fatty acids are essential for our cells to function normally and stay alive. The cell membranes allow the passage of necessary minerals and molecules in and out of our cells. Healthy cell membranes discourage dangerous chemicals and organisms like bacteria, viruses, moulds and parasites from entering the cell. These membranes also maintain chemical receptor sites for hormones, the body's crucial messengers. Fatty acids are involved in countless chemical processes in our bodies and are used as building blocks for certain hormones.

Two types of fatty acids—omega-3 and omega-6—cannot be made by our bodies and therefore must be obtained through our diets. They are called "essential fatty acids" (EFAs), and if we have an adequate supply we can use these EFAs to manufacture the other fatty acids we need.

EFA supplementation has been helpful to many people with allergies, anaemia, arthritis, cancer, candida, depression, diabetes, dry skin, eczema, fatigue, heart disease, inflammation, multiple sclerosis, premenstrual syndrome (PMS), psoriasis, sluggish metabolism, viral infections, etc., and in easing the addiction recovery process.

TRANS- FATS AND CONFUSED CHEMISTRY

Naturally-occurring fatty acids contain double bonds of a particular configuration, referred to as "cis-" by biochemists. The *cis-* causes the molecules to be bent so that the two hydrogen atoms are on the same side of the double bond. This means the bonds between the molecules are weaker due to their irregular shape, resulting in a lower melting point—or, in supermarket shopper lingo, they are solid at room temperature. Fats with either *trans-* double bonds or no bonds ("saturated") are solid at room temperature.

Margarine is made by adding hydrogen atoms to the fat molecules to make them more saturated, raising the melting point of the fat so it remains a solid at room temperature, i.e., the margarine won't run all over the table. This process, called "hydrogenation", requires the presence of a metal catalyst and temperatures of about 500°F (260°C) for the

THE CHEMISTRY OF FATS

Fats are carboxylic esters derived from the single alcohol, glycerol [C₃H₅(OH)₃], and are known as "glycerides". Each fat is made up of glycerides derived from many different carboxylic acids (fatty acids). There are three fatty acid chains in each molecule of fat. The proportions of the various acids differ in each type of fat, while each fat has its characteristic composition which differs very little between samples.

With only a few exceptions, the fatty acids are all straight-chain compounds that vary between three and 18 carbon atoms. Besides "saturated" fatty acids, there are also "unsaturated" fatty acids containing one double bond or more per molecule.

When one of these fatty-acid chains in a fat is replaced with a phosphate group, we get substances called "phospholipids". These derivatives of fats are very important as they make up the membranes of cells.

Morrison and Boyd, in their textbook, *Organic Chemistry*,* had the following to say about fats and cell membranes:

"Phospholipids are found in the membranes of cells—all cells—and so are a basic structural element of life." They also form skins around all the organelles within our cells, such as mitochondria, the nucleus, nucleolus, lysosomes, Golgi bodies, etc. "This vital function depends on their physical properties."

One end of the molecule dissolves in water and the other doesn't. Therefore, in cell walls they exist in a bilayer. The phosphoglyceride ends form the outside of the layer, as these dissolve in water. The bulk of the bilayer is made up of the fatty acid chains. "Non-polar molecules can therefore very easily dissolve and pass through this bilayer, but it is an effective barrier to polar molecules and ions."

So how do these membranes very selectively control the passage of substance in and out of the cells? "The answer...seems to involve the proteins that are found in the cell membrane embedded in the bilayer, and even extending clear through it." These help with the active transport of certain substances.

"Now, if the transport protein is to do its job, it must be free to move within the membrane. The molecules, while necessarily aligned, must not be locked in a rigid crystalline lattice—as they would be if the fatty acids were saturated (or in the *trans*-form). Actually, some of the chains in the membrane phospholipids are unsaturated, and these, with their *cis*- double bonds and the accompanying bend, disrupt the alignment enough to make the membrane semi-liquid at physiological temperatures." From this explanation we can begin to understand the huge importance of these *cis*-unsaturated fatty acids to all the basic processes of life.

Cholesterol is another molecule found in the cell membrane between the fatty-acid chains. Its function is to compensate for changes in membrane fluidity. It can be added to stiffen a membrane that is too loose, or removed to fluidise a membrane that is too loose. — Eds.

reaction to take place. It causes about half of the *cis*- bonds to flip over into a *trans*- configuration.

Hydrogenation became popular in the US because this type of oil doesn't spoil or become rancid as readily as regular oil and therefore has a longer shelf-life. You can leave a cube of margarine sitting out for years and it will not be touched by moulds, insects or rodents. Margarine is a *non*-food! It would appear that only humans are foolish enough to eat it! Because the fats in margarine are partially hydrogenated (i.e., not fully saturated), the manufacturers can claim it is "polyunsaturated" and market it to us as a healthy food.

Many other fatty chemicals are also created when oils are partially hydrogenated. In *Fats that Heal, Fats that Kill* (p. 103), Udo Erasmus stated: "So many different compounds can be made during partial hydrogenation that they stagger the imagination... Needless to say, the industry is hesitant to fund or publicize thorough and systematic studies on the kinds of chemicals produced and their effects on health."¹

Erasmus also quoted a statement about hydrogenation, made by Herbert Dutton, one of the oldest and most knowledgeable oil chemists in North America. It basically boils down to this: because of the known and unknown health effects of these hydrogenation by-products, government health regulations would not allow the process to be used for making edible products if it were to be introduced today.

Another 'side-effect' of hydrogenation is that a residue of toxic metals, usually nickel and aluminium, is left behind in the finished product. These metals are used as catalysts in the reaction, but they accumulate in our cells and nervous system where they poison enzyme systems and alter cellular functions, endangering health and causing a wide variety of problems. These toxic metals are difficult to eliminate without special detoxification techniques, and our 'toxic load' increases steadily with small exposures over time. Since they are increasingly found in our air, food and water, the cumulative doses can add up to dangerous levels over time.

Since *trans*- fats don't occur in nature, our bodies don't know how to deal with them effectively and they act as poisons to crucial cellular reactions. The body tries to use them as it would the *cis*- form, and they wind up in cell membranes and other places they shouldn't be.

In recent years, measurements of *trans*- fats in the membranes of human red blood cells have been as high as 20 per cent, when the figure should be zero. While red blood cells were used because they're easy to access, it's safe to assume that most other cell membranes in the body also contain these unnatural fats.

Trans- fatty acids in cell membranes weaken the membrane's protective structure and function. This alters normal transport of minerals and other nutrients across the membrane and allows disease microbes and toxic chemicals to get into the cell more easily. The result: sick, weakened cells, poor organ function and an exhausted immune system—in short, lowered resistance and increased risk of disease.

Trans- fats can also derail the body's normal mechanisms for eliminating cholesterol. The liver normally puts excess cholesterol in the bile and sends it to the gall bladder, which empties into the small intestine just below the stomach. *Trans*- fats block the normal conversion of cholesterol in the liver and contribute to elevated cholesterol levels in the blood. They also cause an increase in the amount of low-density lipoproteins (LDLs), considered to be one of the main instigators of arterial disease (hardening of the arteries). Meanwhile, *trans*- fats lower the amount of high-density lipoproteins (HDLs) which help protect the cardiovascular system from the adverse effects of the LDLs. *Trans*- fats also increase the level of apolipoprotein A, a substance in the blood which is another risk factor for heart disease. Indeed, *trans*- fats have now been shown to cause even worse problems than saturated animal fats.

Another adverse effect of *trans*- fats in the diet is an enhancement of the body's pro-inflammatory hormones (prostaglandin E2) and inhibition of the anti-inflammatory types (prostaglandin E1 and E3). This undesirable influence exerted by *trans*- fats on prostaglandin balance may render you more vulnerable to inflammatory conditions that don't want to heal! Prostaglandins also regulate many metabolic functions. Tiny amounts can cause significant changes in allergic reaction, blood pressure, clotting, cholesterol levels, hormone activity, immune func-

tion and inflammatory response, to name just a few.

Many of these problems with *trans*- fats have been known or suspected for 15 to 20 years, but have been largely ignored in the US. In Europe, *trans*- fats are restricted in food products, and some countries allow no more than 0.1 per cent *trans*- fatty acid content. In contrast, margarines in the US may contain up to 30 to 50 per cent! Of course, the food industry denies there is any problem with this.

Meanwhile, scientific evidence continues to mount that *trans*- fats contribute to heart disease and possibly other conditions as well. Even the conservative *Harvard Health Letter* referred to them as "the new enemy".²

VESTED INTERESTS

According to Russell Jaffe, M.D., a noted medical researcher, hog farmers will not feed *trans*- fats to their animals because the pigs will die if they eat them. When Dr Jaffe contacted the US Department of Agriculture, he found that it knew all about this but was not interested in the possible human effects since this area was not under its jurisdiction. The US Food & Drug Administration (FDA) hasn't done anything about it, either. The fact that the food industry has succeeded in keeping a lid on public awareness of these facts is testimony to the political power it wields in governmental and scientific circles.

The food industry funds a great deal of research. People in the research community know that you can often predict the outcome of a study if you know who is funding it. In that light, it's unwise to accept blindly the press releases on 'the latest research' without considering who paid for it. There are some rather scientific-sounding foundations out there that are basically 'front' organisations for the food industry.³

FATS IN OUR DIETS

Margarine isn't the only grocery store item with a significant amount of *trans*- fats. Any 'food' that lists "hydrogenated" or "partially hydrogenated" on the label contains *trans*- fats and should be avoided. You may be surprised to discover how many products in your kitchen contain *trans*- fats. They include most baked goods such as bread and crackers, shortenings like margarine and Crisco, refined vegetable oils and most brands of peanut butter. Most peanut butter brands contain sugar or corn syrup which stresses the pancreas and is easily converted to fat by the body.

So be sure to read the labels on packaged foods and avoid those with hydrogenated or partially hydrogenated oil!

Also avoid products containing cottonseed oil. Cotton is not considered a food crop and is heavily sprayed with highly toxic pesticides—some of which wind up in the oil. According to Dr Jaffe, cottonseed oil also contains toxic fatty acids similar to those present in rape seed oil about 30 years ago and suspected of causing several deaths before being taken off the market. These fatty acids caused illness when fed to dogs and pigs. Cottonseed oil is commonly used to fry potato chips, and is found in numerous processed foods.

Currently, the dominant medical opinion is that fats are bad for us and should be restricted in our diets. Given the types of fats usually consumed in America, this is probably a good idea. But several studies have shown that the quantity of fat is not as important as the *quality* of fat and the *balance* of the fats in relation to

each other. In fact, the essential fatty acids (mentioned earlier) help control the types of cholesterol made by the body and help prevent heart disease. So, reducing saturated fats and unnatural *trans*- fats in our diets, while increasing the essential fats, would be a more prudent policy. Many scientists are now advocating this shift in emphasis.

Edward Siguel, M.D., Ph.D., is an award-winning researcher who was invited to investigate fatty acids in the Framingham Cardiovascular Offspring Study. He recently authored a book, *Essential Fatty Acids in Health and Disease*.⁴ Dr Siguel has developed a sensitive test to determine the amounts of the various fatty acids found in humans, and has found a definite correlation with *trans*- fats and heart disease. He has also found that many people with heart disease have low levels of EFAs. In a presentation at the Second Annual Symposium on Functional Medicine in 1994, he stated that insufficiency of EFAs may underlie many of the chronic diseases prevalent in Western societies. He also cautioned that low-fat diets not based on whole foods might be hazardous: "Individuals who maintain normal or low body-weight by eating low-calorie, low-fat, processed foods, such as supermarket cereals, breads and pasta, are at high risk for EFA insufficiency...compounded by the use of hydrogenated oils, leading to elevated levels of circulating *trans*- fatty acids..."

The breast milk of many US mothers also shows an excess of *trans*- fats and low omega-3 fatty acid content. Dr Donald Rudin, in his co-authored book, *The Omega-3 Phenomenon*, stated: "American mothers produce milk that often has only one-fifth to

one-tenth of the omega-3 content of the milk that well-nourished, nut-eating Nigerian mothers provide their infants."⁵

A revealing study was recently published by the Nutrition Research Division of Health Canada. The researchers analysed the milk of 198 lactating mothers across Canada and found that *trans*- fatty acids averaged 7.2 per cent of total fatty-acid content, with a range of 0.1 to 17.2 per cent. Further analysis of these *trans*- fats showed that their major source was

partially hydrogenated vegetable oils (that means margarine). They also noted that elevation of these *trans*- fats occurred at the expense of the EFAs, thus placing the infant in double jeopardy during a crucial period of development.⁶

Both types of EFAs are necessary for proper development of foetal and infant tissues, especially the nervous system. According to John Finnegan, in *The Facts About Fats*, the omega-3s in particular affect the parts of the brain that relate to learning ability, anxiety or depression, and auditory and visual perception. They also aid in balancing the immune system.⁷ A 1991 Mayo Clinic study of 19 'normal' pregnant women, eating 'normal' diets, showed that all of them were deficient in the omega-3 fatty acids and, to a lesser extent, the omega-6s. These researchers recommended that the omega-3 fatty acids be supplemented in every pregnancy, and that women avoid refined and hydrogenated fats during pregnancy.⁸

A study published in the *American Journal of Clinical Nutrition* showed a dramatic difference between the heart-disease rates of populations in northern and southern India.⁹ The northerners were meat-eaters and had high cholesterol levels. Their main source of dietary fat was ghee (clarified butter). The southerners were vegetarians and had much lower cholesterol levels. Present-day 'wis-

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dom' would predict the vegetarians to have the lower rate of heart disease, but, in fact, the opposite was true. The vegetarians had 15 times the rate of heart disease when compared to their northern counterparts! What was the reason for this surprising difference? Aside from meat versus vegetables, the major dietary difference was that the southerners had replaced their traditional ghee (a real food) with margarine and refined, polyunsaturated vegetable oils. Twenty years later, the British medical journal the *Lancet* noted an increase in heart-attack deaths amongst the northern Indians.¹⁰ The northerners had also largely replaced the ghee in their diets with margarine and refined vegetable oils.

One hundred years ago, heart disease was virtually unknown. Today, two-thirds of US citizens develop heart disease. Something has clearly gone wrong with the way we are living, and one of the main factors could indeed be the introduction of overrefined, over-processed, devitalised oils.

Other studies support this idea. For instance, a study conducted at the Harvard School of Public Health indicated that intake of partially hydrogenated vegetable oils may contribute to the risk of heart attack.¹¹ Research by Dr Siguel has also given more weight to the theory that dietary *trans*- fatty acids are a risk factor for heart disease.¹²

A report by the Danish Nutrition Council said that studies suggest that the consumption of *trans*- fatty acid from margarine is equally, or perhaps more, responsible for the development of arteriosclerosis than saturated fatty acids. They recommended reducing the *trans*- fatty acid content in all Danish margarine products to 5 per cent or less (it was then 0 to 30 per cent).¹³

Another study done by the Department of Nutrition at the Harvard School of Public Health in Boston, analysed the diets of 239 patients admitted to Boston hospitals for their first heart attack, and compared them with the diets of 282 healthy control subjects. After adjusting for several lifestyle variables, they found that margarine intake was significantly associated with the risk of myocardial infarction.¹⁴

A Harvard Medical School study followed more than 85,000 women over an eight-year period. The researchers compared the diets of those who developed heart disease over that time with those who did not. They found that major dietary sources of *trans*- fats, such as margarine, were significantly associated with higher risks of coronary heart disease.¹⁵

PROBLEMS WITH COMMERCIAL PROCESSING

Refined polyunsaturated vegetable oils have been very popular in the US since the anti-cholesterol fad began many years ago and the medical profession began promoting their use. When properly prepared and utilised, some of these oils are healthful sources of EFAs. Unfortunately, the standard commercial refining process destroys the EFAs and creates high levels of *trans*- fatty acids, while removing important natural constituents and protective agents like minerals and vitamin E.

In *The Facts About Fats* and *Fats that Heal, Fats that Kill*, John Finnegan and Udo Erasmus describe the usual commercial refin-

ing process for vegetable oils. It begins with seeds that may contain high levels of pesticides and herbicides. The seeds are crushed and subjected to a series of chemical treatments at temperatures up to 520°F (271°C). These treatments include the use of toxic solvents, caustic soda, preservatives and defoamers, and they result in the destruction of essential fatty acids, loss of vitamins and minerals, and the formation of *trans*- fatty acids and free radicals. This is exactly the opposite of what is desirable. It is all in the name of longer shelf-life and consumer acceptance (what's left looks clean and pretty!). This also happens to the oils used in processed foods, which means most everything that comes in a can or a box. *Remember to read those labels!*

According to Finnegan and Erasmus, the "cold-pressed" or "expeller-pressed" oils available at health food stores are no guarantee of quality. Expeller-pressing still generates temperatures up to 200°F (93.3°C), and most of these oils are then refined and deodorised using basically the same nutrient-destroying process used in commercial 'grocery store' oils.

Be wary of claims like "certified organic", as there have been instances of fraudulent misrepresentation in this regard. Some companies have been caught lying about the source of their seeds and using regular commercial seeds instead of organic ones. There have even been cases of companies simply rebottling regular oil or mayonnaise with a 'health food' label and charging higher prices.

Finnegan mentions two reputable certifying agencies: FVO (Farm Verified Organic), and OCIA (Organic Crop Improvement Association). He reports that only two companies meet his criteria for production of healthful oils: Omega Nutrition in Ferndale, WA (phone 1-800 661 3529), and Flora, Inc. in Lynden, WA (phone 1-800 446 2110 or (360) 354 2110). He also contacted one of the most well-known producers of 'health food' oils in the nation, but they declined to discuss

their oil processing methods and refused to allow him to visit their facilities.

Note that light and oxygen, in addition to heat, also cause extensive damage to oils. According to Erasmus, light destroys oil 1,000 times faster than does oxygen, so it is important to purchase unrefined oils in black, lightproof bottles. Oxygen should be removed from the bottle and replaced with an inert gas, such as nitrogen or argon. Omega Nutrition packages its oils in this fashion. Flora's oils are bottled in dark glass, reducing the amount of light but not eliminating it. While considerably more expensive, they should be worth the extra money, considering the facts presented in this article.

EFA BALANCE AND OUR HEALTH

The two groups of essential fatty acids—omega-3 and omega-6—are named for their molecular configurations and where the first "unsaturated" bond occurs along the chain of carbon atoms.

Omega-6 oils are found primarily in vegetables and seeds. They are converted to the E1 prostaglandins (mentioned earlier) via several chemical steps. Most people take in enough of these

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fatty acids, but some have difficulty converting them to the active prostaglandins. This blockage is commonly caused by excess *trans*-fats, anti-inflammatory medications like aspirin or Tylenol, or deficiencies of vitamin B6 or magnesium. An insufficiency of omega-6 EFAs can result in auto-immune problems, breast pain and lumpiness, eczema, hyperactivity in children, hypertension, inflammation and PMS. Supplementing with borage, evening primrose or black-currant seed oils will usually bypass the blocked step and provide the necessary precursor to make the desired prostaglandins.

Dr Siguel has found that the omega-3s are the more likely to be deficient in our Western diets. Because of food processing and dietary choices, the average Western diet today contains only one-sixth the amount of omega-3 fatty acids needed for healthy function—compared to a healthy balance 100 years ago. Evidence indicates that a deficiency of omega-3 fatty acids is associated with arthritis and joint stiffness, irritable bowel syndrome, PMS, prostate problems, various skin disorders as well as depression, phobias and schizophrenia.

The two main sources of omega-3s are oils from organic flax seeds and from cold-water fish (such as mackerel, sardines, tuna, trout and salmon). These fish should not be fried because of the effect of the high temperatures involved and the resultant free-radical damage. Unlike chicken and turkey, cold-water fish should be eaten with the skin on, as this is where the highest concentration of desirable fats is located.

There is some concern about eating fish frequently, due to the chemical and heavy-metal pollution in the oceans. Predatory fish concentrate these pollutants in their fatty tissues, but deep-ocean fish are usually less tainted than coastal species. Freshwater fish near agricultural, industrial or mining areas are best avoided due to their high-level intake of toxic chemicals. Farm-raised fish are fed

something akin to pet food and should be avoided; they are not as healthy and have insignificant levels of omega-3 fatty acids.

When properly processed, organic flax seed oil has the highest concentration of omega-3 fatty acids, at 57 per cent. Omega-3s are also found in certain other "unrefined" seed oils such as chia, soy and canola, but in much smaller amounts. Flax seed oil is particularly sensitive and must be processed under stringent conditions (cold, without light or oxygen), nitrogen-packed in dark bottles to avoid oxidising, and shipped and displayed in refrigerated containers.

While all unrefined, unsaturated oils should be processed, packaged and distributed in this way, the vast majority are not. The companies mentioned earlier adhere to these special methods, and you should be able to buy their oils with some assurance that you are getting a healthy product. We have used oils from both companies for the past few years and have been very happy with them. While more complicated and costly, these methods may someday play an important role in reducing many common degenerative diseases, which are much costlier in the long run especially in terms of human suffering and loss of potential.

The healthiest foods are usually organically grown and should be eaten close to their natural state. Certified organic seeds and grains are available at most food co-ops. Eating organically grown seeds and other foods is strongly recommended for minimising chemical intake and optimising nutrient content. When

consuming whole foods, we get a complex array of nutrients which naturally work together to fuel the intricate chemistry that keeps our bodies going, but many of these nutrients are normally lost in commercial processing.

Even the most painstaking human efforts to produce healthy packaged foods and oils always fall short of nature's accomplishments. The best oils are provided by nature, neatly packaged to prevent oxidation of their precious contents. Freshly-ground organic flax seeds contain fresh oil (protected by the husk), and their fibre is the richest source of certain substances called "lignans", found to have potent anticancer, antibacterial, antifungal and antiviral properties. Flax fibre has from 100 to 800 times more lignans than other fibre sources. This is an inexpensive and tasty way to ensure adequate intake of omega-3 fatty acids (see directions outlined below). If you prefer, you can purchase quality flax-seed oils in bottles or in capsules. Just make sure you know how they are processed! Flora and Omega Nutrition offer good-quality flax oils in bottles and capsules.

'THE GOOD OIL' ON HEALTHIER ALTERNATIVES

Here are several additional ways to improve your fatty acid balance and avoid the *trans*-fat trap:

So be sure to read the labels on packaged foods and avoid those with hydrogenated or partially hydrogenated oil!

- Have some freshly ground flax seeds every day. Pulverise three tablespoons of seeds in a blender or coffee grinder to yield about one tablespoon of oil (mixed in with the powder). This will approximate the suggested daily amount of omega-3 oil for an average person. It can be mixed with cereal, blended in a smoothie or added to yoghurt. You can also mix it with warm (not hot) apple juice, and add some sliced banana or other fruit to make a tasty, nutritious, pudding-like cereal that's filling and will do

wonders for bowel function! Be sure to consume the ground flax-seeds within 10 to 15 minutes to minimise the damage from oxidation. However, a note of caution: in doing allergy testing, I have seen several people (my wife and myself included) who are allergic to flax seeds, and others who are allergic to psyllium seeds which are commonly used for their fibre content.

- Use butter instead of margarine or shortening in cooking. Butter has some problems, too, such as residual hormones and pesticides, but it is a whole food. Whole foods have fat-mobilising nutrients to take care of their own fats if eaten in moderation. If you want to use butter, try to get organically-produced butter.

- An even better alternative is the organic ghee, or clarified butter, mentioned earlier. Ghee is the cooking fat most highly regarded by Indian and French chefs. It has a good aroma and will not burn, smoke or develop toxic compounds when heated.

- Organic, unrefined coconut butter is an alternative to regular butter in your diet. Omega Nutrition has this product. However, most other coconut oil products are hydrogenated. Coconut oil has been subjected to a smear campaign by commercial vegetable oil producers, but the research studies cited have used hydrogenated coconut oil, which may have skewed the results.

- Use olive oil or a 50:50 mixture of ghee and olive oil. Do not fry or sauté with "polyunsaturated" light oils such as safflower, sunflower or corn oils. They oxidise readily into damaging free-radicals at high temperatures. Free radicals are highly reactive

molecules that can tear into your cells and start nasty chain reactions that can leave behind extensive damage, including alteration of your genetic code (DNA) and formation of cancer cells. Free radicals are widely considered to play a major role in degenerative disease. While there are virtually no EFAs in olive oil, it is rich in "mono-unsaturated" fatty acids and is not so easily oxidised. Use an "extra virgin, cold-pressed, first pressing" olive oil, preferably with a greenish colour and some sediment on the bottom, which usually indicates less processing. Most co-ops carry it.

• If allergic to milk, you can often substitute a 50:50 mixture of apple sauce and organic, unrefined canola, sunflower or safflower oil for margarine or butter in recipes, which we have tried in pie crusts and cakes with great results. We used to substitute canola oil by itself, but the texture was somewhat drier and a little crumbly.

• Try non-hydrogenated peanut butter, available in some grocery stores and all food co-ops. The peanut butter will separate, with the oil floating to the top of the container. The best brand is probably Arrowhead Mills. They sun-dry their organic peanuts to avoid growth of a common mould that produces aflatoxin, which is as toxic as the name suggests. Most commercial peanuts reportedly have aflatoxin as well as pesticide residues. Almond or walnut butters contain healthier fats than peanut butter, without the mould problem. You can find them at food co-ops and health food stores.

• Buy your oil in sealed bottles and avoid the bulk oils in co-ops, since they are usually rancid (free radicals again). An oil that tastes bitter when you place a drop on your tongue is rancid and should not be consumed.

• Always refrigerate your oils after opening. Unrefined oils are best refrigerated as soon as you buy them, to prolong their shelf-life. If they are not in lightproof bottles, keep them out of the light.

• The greater your intake of unsaturated fats like vegetable oils and fish oils (EPA/DHA omega-3s), the more you need antioxidant protection against free-radical damage. If you take supple-

ments of fish oil or evening primrose oil, or use polyunsaturated oils, consider taking extra vitamin E. An effective daily dose of vitamin E is about 300 to 400 IUs per day, and "mixed tocopherols" is probably the best general-purpose form to use. Many studies support its effectiveness in reducing risk of heart disease, arthritis and other free-radical-related diseases. Since vitamin C is used to regenerate 'used' vitamin E, supplementing with 500 to 1,000 mg of vitamin C a day would be prudent as well.

• The most expensive oils and supplements cannot fully compensate for an unhealthy diet and lifestyle. Use common sense and consult with a nutritionally-oriented health professional when you have health concerns. Books by Dean Ornish, M.D.¹⁶ and

John McDougall, M.D.¹⁷ offer many excellent ideas regarding diet and lifestyle, and I recommend them for basic dietary information, although their programs tend towards very low fat intake. However, to ensure adequate EFA intake you should have some raw, organic nuts and seeds along with high-quality oils (such as those mentioned above) to supplement these low-fat diets.

RAISING PUBLIC AWARENESS

There are still holdouts within the 'scientific' community, particularly those employed or funded by the

food industry, who claim there is not yet sufficient proof that *trans*- fats are dangerous, and then cite studies that justify their position. This is the name of the game in modern-day 'science' where egos and money are involved.

However, most studies currently appearing in the literature support the idea that these chemically-altered fats are harmful. In such cases of conflict, I always side with Mother Nature: she is much wiser than we will ever be!

Remember that most of this information about *trans*- fats has been known for many years, but processors have succeeded in keeping the issue out of the public eye—another example of *caveat emptor* (let the buyer beware) in the food industry. Now that you are aware of it, the rest is up to you! Good luck, and good health!

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Endnotes

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